

Report of the Department of Agriculture for the year 1943.

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PART I. AGRICULTURE IN NYASALAND.

(For reasons of economy this Report has been abbreviated insofar as it has been possible to do so without detriment to the record of the year's activities. A number of the usual statistical tables, including meteorological data, have been omitted and certain sections of the Report have been curtailed. More detailed information regarding any particular aspect of the work of the Department will be supplied to any interested person, on application to the Director).

STAFF.

The newly-created posts for Senior Agricultural Officers were filled by the promotion of Messrs. E. Lawrence and R. W. Kettlewell. Mr. A. B. Cormack was promoted from Senior Agricultural Assistant to Agricultural Officer and Mr. W. V. Rose arrived from the United Kingdom on first appointment, also as an Agricultural Officer. Three officers who had previously served for a number of years in temporary capacities were appointed to the permanent establishment of Agricultural Assistants. The release of further officers from military service during the year materially strengthened the field staff of the Department which is now reasonably well equipped to tackle its manifold and important duties

POLICY.

The work of the Department has been concentrated on the production of crops and on the conservation of the natural resources of the Protectorate. With the exceptions of wheaten flour and sugar the country is self-supporting in all agricultural products and policy has been directed to the accumulation of reserves of essential food crops and to the export of food and economic crops on the greatest possible scale. Weather conditions have not facilitated this latter objective. The maintenance of soil fertility, improvement in agricultural methods and the introduction of new soil conservation measures are in the forefront of the programme and it has been possible for them to receive continuous and informed attention as the result of the additions which have been made to the field staffs.

PRODUCTION AND EXPORT.

Climatic conditions during 1943 were most adverse and the record of agricultural achievement was correspondingly disappointing. This should not detract from a just appreciation of the energetic endeavours by all communities to make their contribution to the production war-effort of the country and to increase output in every direction. Had it not been for these endeavours it would have been necessary now to record a more modest and dismal account of what in fact has been a strenuous year. Once more tobacco production was the highest ever recorded in the Protectorate but the quality of the crop was mainly very poor. All tea available for export was again purchased by the Ministry of Supply and though the tea bushes have withstood adverse conditions remarkably well the accumulated effect of three years drought or semi-drought conditions affected yields very considerably. The acreage under Tung continues to increase and the export of oil, which is made under the direction of the Ministry of Supply, showed a marked increase. The only sisal estate in production worked at full pressure whilst maximum output was obtained from the only rubber plantation in the country. The growing of Pyrethrum has been organised under the grant of an Exclusive Licence. Cotton production was the lowest in recent years. In the Central areas this was largely due to the counter attraction of tobacco but in the important Lower River Districts, which constitute the chief area of production, the main crop was ravaged by Red Bollworm. Food crops were almost universally disappointing. Maize was generally sufficient throughout the Southern Province, with small surpluses in some districts, but the Northern Province, usually a reservoir from which supplies can be obtained for elsewhere, experienced the most meagre crop of recent years and a serious shortage of this staple foodstuff developed in some districts towards the end of the year.

Beans and groundnuts were scarce whilst rice was in short supply. With the exception of potatoes, soya-beans and a carry-over of maize from the previous year no export of foodstuffs of any kind took place.

European production and acreage of the principal crops are given in the following table:—

	<i>Acrea</i>				<i>Yield in lb.</i>			
	1943		1942		1943		1942	
Tea ...	19,541	...	19,110	...	11,141,447	...	12,240,279	
Tung ...	7,015	...	6,640	...	160,165	...	84,748	
Tobacco	7,852	...	8,497	...	2,256,705	...	3,695,104	
Sisal ...	923	...	821	...	727,163	...	547,904	
Cotton (lint)	98	...	243	...	11,382	...	41,216	
Rubber	1,430	...	1,310	...	235,086	...	215,264	
Soya Beans	1,285	...	1,190	...	846,800	...	1,033,200	

Native production and numbers of growers for the two principal crops, viz. cotton and tobacco, are shown below:—

	<i>No. of growers*</i>		<i>Amount sold</i>	
	1943	1942	1943	1942
			Short tons	
Cotton (seed cotton)	38,599	.. 42,096	.. 3,411	.. 8,664
Tobacco	108,147	.. 82,788	.. 12,256	.. 10,805

*Approximate.

The exported amounts and values of the various items of agricultural produce and raw materials were as follows:—

	<i>Amount</i>		<i>Value</i>	
	1943	1942	1943	1942
	lb.	lb.	£	£
Beeswax	4,474	7,366	186	307
Capsicums and Chillies	16,369	27,110	205	339
Cotton (lint)	4,019,110	3,737,116	100,028	54,499
Cotton (seed)	3,104,031	—	3,371	—
Fibre (sisal)	42,164	431,294	226	2,314
Potatoes	218,054	598,409	487	1,335
Maize and Maize Flour	3,006,021	7,805,917	7,549	8,712
Rubber	316,133	186,100	7,122	3,877
Soya Beans	1,204,763	1,671,308	2,151	2,984
Strophanthus	15,116	21,953	1,512	2,195
Tea	10,975,211	12,382,404	503,031	567,527
Tobacco:—				
leaf dark-fired	7,441,137	8,960,862	279,043	336,032
leaf flue-cured	555,463	920,089	20,830	34,503
leaf air-cured	824,747	1,230,092	30,928	46,129
strips dark-fired	7,369,923	5,299,148	276,372	198,718
strips flue-cured	740,537	1,002,412	27,770	37,591
strips air-cured	1,605,669	1,310,023	60,212	49,126
Tung Oil	59,166	45,028	5,917	4,644
Tung Seed	1,300	—	65	—
Castor Seed	48,900	98,248	204	525
		TOTAL	1,327,209	1,361,357

TOBACCO.

The tobacco crop, which amounted to over 26½ million lb., was the largest ever produced in the country and exceeded the previous highest of last year by nearly 1½ million lb. This increase came from native produced fire and air-cured types, whilst European production showed a fall of 1,400,000 lb. Exports to West Africa exceeded 2 million lb. In the nine years since the first consignment went to this market, it has grown steadily from .07 per cent. of all exports in 1935 to 14.8 per cent. in 1948.

The outstanding features of the season were violent cyclonic storms in the early weeks, followed by two and a half months of very little sunshine with consequent low day temperatures. After mid-March sunshine became more normal but the damage had already been done and crops throughout showed poor root growth and under-developed leaf. A great deal of short, thin, perished leaf was produced.

Marketing conditions were extremely difficult owing to the large amount of perished leaf which growers were unable to grade out of the crops. Consequently a very large number of parcels had to be sent for re-grading and much of this was not again presented at the markets. An abnormal quantity was bought as scrap as not reaching the Auction Floor standard. Difficulty was also experienced in finding a sufficient number of competent market supervisors and classifiers.

Prices on the Auction Floor, except for the flue-cured leaf, were high, due to keen demand rather than to the quality of the crop. For air-cured leaf the average price was above that of the previous year, but the average for fire-cured was lower, due entirely to the high proportion of short grades. Compared with the year 1942, flue-cured prices showed a fall of .74d. per lb., and fire-cured of .36d. Air-cured, on the contrary, showed a rise of .28d. due to a high proportion of long grades.

Actual production of various types was as follows:—

EUROPEAN.		1943		1942
		lb.		lb.
Flue-cured	...	1,940,017	...	2,771,440
Fire-cured	...	235,274	...	739,872
Air-cured	...	81,414	...	183,792
		<u>2,256,705</u>	...	<u>3,695,104</u>
NATIVE.		1943		1942
		lb.		lb.
Flue-cured	...	153,338	...	171,295
Fire-cured	...	20,527,595	...	18,023,237
Air-cured	...	3,831,796	...	3,639,467
		<u>24,512,729</u>	...	<u>21,833,999</u>
TOTAL	...	<u>26,769,434</u>	...	<u>25,529,103</u>

The quantities of the different types sold on the Auction Floor and the average prices paid were as follows:—

		Amount		Average price	
		(to nearest 1,000 lb.)		per lb.	
		1943	1942	1943	1942
Flue-cured	...	2,104,000	3,033,000	9.10d.	9.84d.
Fire-cured	...	12,066,000	11,264,000	7.52d.	7.88d.
Air-cured	...	1,368,000	1,101,000	7.73d.	7.45d.

The number of registered Native Trust Land growers and the average amount of tobacco produced per grower were as follows:—

	<i>Growers</i>		<i>Yields per Grower</i>	
	1943	1942	1943 lb.	1942 lb.
Northern Province	68,052 ...	47,783 ...	160.8 ...	191.1
Southern Province	16,184 ...	14,022 ...	192.1 ...	235.7

The amount of tobacco purchased from growers on Native Trust Land and Private Estates respectively are shown below:—

	<i>Trust Land</i>		<i>Private Estates</i>	
	1943 lb.	1942 lb.	1943 lb.	1942 lb.
Northern Province	10,434,047	9,131,195	8,133,879	7,233,152
Southern Province	3,108,351	3,305,712	2,836,452	2,163,940
	<u>13,542,398</u>	<u>12,436,907</u>	<u>10,970,331</u>	<u>9,397,092</u>

COTTON.

The cotton crop was the poorest, both in size and quality, for some years. The two southernmost districts in the Protectorate, which normally produce the greater part of the crop, experienced a heavy outbreak of Red Bollworm, and early Jassid was severe. Previously, planting had been delayed on account of insufficient rain and this in turn was succeeded by phenomenal weed growth. As a result of these misfortunes only the later pickings gave a modest crop of marketable value. In the central areas in the Northern Province production declined as a result of the counter-attraction of tobacco and groundnuts, both of which had obtained very high prices in the previous season. Similarly in North Nyasa, where it is estimated that the acreage under cotton was reduced by as much as 16 per cent. as a result of the increased attention being given to rice.

Details of Trust Land and Private Estate seed cotton production were as follows:—

<i>Southern Province</i>				<i>Northern Province</i>	
short tons				short tons	
Lower Shire ...	...	780	...	Ncheu	21
Chikwawa ...	...	1,331	...	Dedza	183
Cholo ...	...	134	...	Dowa	155
Blantyre and Central Shire	...	158	...	Kota Kota	168
Upper Shire ...	...	93	...	North Nyasa	352
South Nyasa ...	...	36	...		
		<u>2,532</u>			<u>879</u>

Of the total of 3,411 tons, 497 tons were produced by native tenants on private estates. The comparative figures for 1942 were 8,664 and 1,278 short tons respectively.

The crop was purchased under a guarantee obtained from the Ministry of Supply whereby the disposal of the Protectorate's crop for the duration of the war and for one complete marketing season thereafter is now assured. The crop was handled and processed by Nyasaland cotton firms who acted as Agents for the Government. In the event the Ministry did not require to take delivery of the finished bales and these were successfully sold locally. The profits from these transactions are to be placed in a fund and are available for use in the improvement and betterment of the cotton industry generally.

The crop was again bought in two grades only and prices remained fixed for the season. These latter varied between 1½d. and 1¼d. per pound for 1st quality seed cotton, 2nd quality being purchased at one-quarter of the price obtainable for Grade I.

European production of seed cotton amounted to 17 short tons compared with 62 short tons in 1942.

TEA.

The year was again a difficult one for the tea industry. Fertilisers remained in short supply and weather conditions were unfavourable. At the beginning of the season the Cholo District experienced even less rain than in 1941 (the most severe drought year since the beginning of the century) and the October-December crop was very poor. The first good rains fell in December but the crop did not begin to flush normally until late in January. General rains then fell in the tea areas until the end of March but were often excessive and were accompanied by low temperatures and little sunshine, with the result that good flushings could not be obtained. In the Mlanje District, although yields were lower than usual, more satisfactory conditions prevailed and good crops were plucked. Planting conditions were favourable and excellent stands of young tea were established.

There were no outstanding diseases and pests though Red Spider was more in evidence than formerly. The incidence of both "Yellows" sulphur deficiency disease and collar crack disease (*Armillaria mellea*) was lower than usual.

Shortage of labour in both Mlanje and Cholo resulted in some loss of crop. A steady improvement was made in the living conditions of the labourers. Wages were generally higher and better balanced rations were issued on many estates.

TUNG.

Tung development has steadily continued and with the planting of 207 more acres during the year the total acreage was brought to 6,847.

In the Cholo District where the majority of plantations are situated the 1942-1943 rainy season started well, but the rains ceased early and the ensuing dry season was unusually severe. There are indications that the drought has had an adverse effect on the *montana* crop which was set in October and this is hardly surprising in view of the fact that this was the third season in succession in which rainfall was below normal. On the other hand the crop set by the *fordii* trees in Cholo (though not in Mlanje) is noticeably above average—a fact for which no satisfactory explanation can yet be offered. The export of tung

nuts from the Protectorate except for seed purposes being prohibited, the entire crop was processed at the Cholo factory and the resultant oil consigned abroad under the instructions of the United Kingdom Ministry of Supply.

MINOR CROPS.

WHEAT. Recorded sales of wheat produced by native growers totalled 211 short tons as compared with 214 tons in the previous year, to which must be added a further small quantity grown on European Estates. Local production still falls short of the consuming capacity of the Protectorate but as a firm price has now been declared ahead of the planting season and as new areas are being brought into cultivation it is anticipated that the country will increasingly become less dependent upon supplies of imported flour.

RICE. The market sales of paddy were the highest ever recorded and amounted to 1,763 tons. In addition to this a substantial quantity of hand-hulled rice is known to have been 'hawked' in the urban areas. The main increases were achieved in the North Nyasa and Mlanje Districts whilst in Kota Kota, despite adverse growing conditions, production remained stable. The demand for this product continues to be strong and widespread, but as available supplies were again inadequate to satisfy the needs of the country none of the numerous requests received from neighbouring territories could be met. As an increased price has now been guaranteed for the next three seasons further substantially increased production can confidently be anticipated.

EUROPEAN POTATOES. There was some decrease in production due to a lessening demand, particularly from Portuguese East Africa. Nevertheless markets in the Dedza and Ncheu Districts handled 245 tons of potatoes whilst an (estimated) similar quantity from local sources met the urban demand in the Southern Province.

MAIZE. Unfavourable weather conditions reduced the amount of maize available for sale in the Northern Province from 5,170 tons in 1942 to 1,030 tons in 1943 and an acute shortage resulted in some areas before the end of the year. Fortunately most districts in the Southern Province secured a good harvest and were able to provide a substantial surplus for estate and commercial requirements and it is estimated that the growers sold some 6,800 tons after reserving sufficient for their own requirements.

GROUNDNUTS AND PULSES. The groundnut season was favourable, the prevailing weather conditions being inimical to rosette disease, and 207 tons were brought to markets in the Northern Province as compared with only 60 tons in 1942. The crop in the Southern Province is mainly disposed of by door-to-door selling in the towns and no records are available. The bean crop was largely a failure. Pests, disease and climate all took their toll and supplies were very short throughout the year.

PYRETHRUM. Under the grant of an Exclusive Licence production was begun on the Nyika Plateau in the Mzimba District and the venture is emerging from the experimental to the commercial stage. The crop is grown by natives on Trust Land, under European control, and the possibilities of introducing the crop into other selected areas are being explored.

RUBBER. Plantation rubber produced and exported amounted to 235,086 lb. which is an increase of 20,764 lb. over the previous year and represents 50% more than in the year 1939. The wild rubber collected and despatched amounted to 51,165 lb.

PESTS AND DISEASES.

CROP PESTS. Cotton in the two Lower River districts and in the Lake Shore area suffered from an unusually sharp attack of Jassid. A small acreage in the Port Herald district was lost by this infestation but, in general, climatic conditions were not good for crop growth.

Tobacco Aphis was particularly severe in parts of the Southern Province on Native Trust Land tobacco. The pest is always most serious in dry years, but it has become increasingly important over many seasons now. Meticulous field husbandry in the growing of tobacco is obviously essential if successful crops are to be produced over a large area by native growers and the destruction of seed-beds at the earliest possible time, careful removal and burying of 'cabbaged' and other diseased plants from the fields, and thorough up-rooting of crop remnants after harvesting, must be rigorously enforced if clean crops are to be produced year after year.

Tung suffered in some areas from various types of scale insects, in particular two kinds of Mealy Bug. One of these, *Pseudococcus perniciosus*, W. & N., was discovered late in the year to have obtained a fair hold in one plantation. Rather drastic measures of pruning out and burning *in situ* of the worst infected branches, followed by continuous hosing from a strong jet of plain water for three or four weeks, were employed and the pest appeared to be reasonably well checked.

Wheat, grown on an increased acreage by Europeans, was not attacked by any serious insect pest but a caterpillar stem-borer of an unusual species of *Sesamia* (probably *Sesamia epunctifera*, Hmps.) was recorded from late maturing wheat in Zomba and Cholo, and might possibly become a pest of importance.

LOCUSTS.

The Red Locust (*Nomadacris septemfasciata*, Serv.) was the only locust present in the Protectorate, and egg-laying and hopper development occurred only through the Shire River Valley from south of Port Herald to north of Liwonde, mainly on the west and northern side of the river.

Damage by hoppers, where spraying had not been possible, occurred mainly in a portion of the Chikwawa district where hopper bands emanated from the Lengwe Game Reserve, and in the southern part of the Lisungwe valley in the Central Shire district.

The movement of flying swarms during the dry season followed its usual course, but with the onset of the 1943-44 rains the return movement of these swarms to the lower altitudes, followed by egg-laying, seemed to be practically negligible. No egg-laying was reported, and by January, 1944, only a few scattered hopper bands of small dimensions had appeared in the Chiromo area of the Lower Shire district.

PART II. WORK OF THE DEPARTMENT.

MAKWAPALA AGRICULTURAL TRAINING CENTRE.

The work undertaken at this centre was described in some detail in the Report for 1942 and there is no important change to record. The training of the second (1941) group of students was completed in November and of the eighteen candidates who took the final examination fifteen were successful and were subsequently posted to various districts as Agricultural Instructors. Twenty new candidates were received for the probationary course which began in November. These represented in the majority students from Central Mission schools with a minimum educational attainment of Standard 5. In view of the fact that a number of the probationers fail to qualify for the two-year course and are therefore eliminated the number enrolled was less than could have been desired. This is however, as might have been expected under present conditions, a handicap which affects all employers and institutions. So many professions and appointments are now open to educated Africans that competition to secure suitable candidates and probationers is severe.

Throughout the year the students devoted themselves to their training with enthusiasm and made excellent progress. The School Committee, composed of the students in rotation, was again responsible for discipline and carried out its duties very creditably. The many signs of a healthy and growing community spirit in the School Village continued to be an encouraging factor. An interesting and important development in the handicrafts training for students' wives was the introduction of cotton spinning from locally-produced material. This work is conducted by the wife of the Agricultural Officer in charge of the Centre and was received with great keenness by the women, who have shown that they can quickly become proficient in spinning a serviceable 2 ply yarn. Many garments, mainly jerseys, stockings and children's clothes, were soon in evidence and a number of the women later commenced to weave patterned fabrics on simple looms constructed at Makwapala. Amongst other visitors during the year the School was privileged to receive His Excellency the Governor and Sir Cosmo Parkinson, G.C.M.G., K.C.B., O.B.E., in September and Mr. C. W. M. Cox, C.M.G., Educational Advisor to the Secretary of State, in July.

The Department is conscious of the devotion with which Mr. and Mrs. Newby undertake their work at Makwapala and keenly anticipates the time when many more Instructors trained at the Centre will be available for district duties.

MARKETING OF NATIVE CROPS.

The marketing organisation for native food crops worked smoothly. Only minor amendments to the regulations were introduced and no new areas were brought within the control of the Marketing Ordinance. In the Mlanje District the first permanent brick market was constructed.

As reported elsewhere the anxiety which has been experienced annually since the outbreak of war regarding the disposal of the cotton crop was finally dispelled as a result of an undertaking by the Ministry of Supply to purchase the entire crop at guaranteed prices for the duration of the war and for one complete marketing season thereafter.

An important event during 1943 was the separation of the Native Tobacco Board from the Department. The former was transferred to Limbe and is now solely concerned with the purchasing and marketing of the Native Trust Land tobacco crop. The production of the crop is now the responsibility of the Department and the officers of the Tobacco Board who were previously concerned in the cultivation and handling of the tobacco were all absorbed into the Department. The Director of Agriculture remains Chairman of the Board, whose Executive Officer is an experienced Secretary-Manager.

EXPERIMENTAL STATION.

The augmentation of the European staff of the Department has enabled fuller programmes to be undertaken at the various experimental stations. Thus the Likuni and Zomba stations are in process of becoming once more centres of experimental work whilst seed farms were opened at Namalanga and Makanga in the Southern Province. Only minor operations were undertaken at the North Nyasa, Tiwi, Masambanjati and Chirimba stations.

In addition to the Experimental Stations both the Department and various Native Authorities maintain a number of demonstration plots throughout the Protectorate where improved methods of cultivation are practised and where improved varieties of crops are displayed for the benefit of the neighbouring peasants. The example of good agricultural technique is usually appreciated but infrequently emulated.

PORT HERALD. The organic manuring and ridge cultivation experiments were continued. In the former a dressing of compost at the rate of 5 tons per acre gave significantly higher yields than the other treatments. The plots in which plant residues had been buried took second place. A groundnut variety trial was undertaken and compost and silage were made on a generous scale.

ZOMBA. This station has been mainly on a maintenance basis since the outbreak of war and has been used chiefly to produce the tobacco seed which is issued to Native Trust Land growers in the succeeding year. It is now to be rehabilitated as a full-time experimental and demonstration farm and certain developments and improvements have already taken place. The remaining Robusta coffee trees were removed and the citrus plantation has been renovated. Much of the station is in poor heart and restorative crops and grass-fallows are to be planted.

LIKUNI. This station also has been on a maintenance basis but it has now been possible to provide an officer for the centre. The season was devoted to reviving the general standard of farming and no experimental work was re-started. The herd which had sadly deteriorated, is being gradually culled and some good new blood is being introduced by purchase.

NKHANDE. Progress has been made on the model holding which is the main feature of the station. Erosion has been stopped by contour bunds and box ridging, and fertility is being slowly restored to the worn out land by compost and pigeon pea fallow. Compost had a marked effect, and the method of preparation of a further supply is of interest. It was made of green grass cut in March and inoculated with cattle dung, and was neither turned nor watered. The

compost appears good and samples have been submitted to the Agricultural Chemist for analysis. The Agricultural Officer at Ncheu also reports that work on the holding showed that the native practice of shallow digging and burial of weeds is more economical of effort than a light surface weeding. The former operation is more arduous, but the weeds are more successfully suppressed and subsequent hoeings need be less frequent.

The better utilisation and management of the small herd of cattle has been planned in conjunction with the Veterinary Department, and some 1,500 Eucalyptus and Pine seedlings were added to the timber plantations.

NCHENACHENA. The principle functions of this station have been the multiplication of coffee seedlings for local issue and of pyrethrum for planting on the Nyika Plateau. The coffee plots have outlived their experimental purpose and the bushes have been uprooted to allow for replanting and subsequent management in conformity with the findings of the earlier experiment. The latter proved the value of heavy mulching to reduce evaporation of soil moisture and to add humus to the soil. Compost also showed a general improvement, but all other treatments allowed heavy deterioration to an uneconomic level.

TEA EXPERIMENTAL STATION: MLANJE.

The station suffered from a long unbroken dry spell lasting from the end of April to early November. This was the third year of drought but the tea bushes have withstood these conditions remarkably well and although the majority of the "supplies" in the established tea failed to survive there were few failures in the new clearings. The average yield of made tea on the station was 1,110 lb. per acre and income from the sale of leaf amounted to £913.

The tea experimental programme, described in the 1942 and previous reports, was maintained, but the difficulty of obtaining fertilisers for the manurial experiments makes their continuance doubtful.

In addition, observation work on rice varieties, cucurbits and gram were undertaken. Compost experiments were conducted and the training of compost-makers for estates was continued.

Work on cassava mosaic was maintained and budded citrus and vegetable seed were produced on a substantial scale.

The station has been much improved by the addition of various buildings which include a store, pig-sties, cattle shed, dairy, and a number of houses for labourers and station headmen.

TUNG EXPERIMENTAL STATION: CHISAWANU, CHOLO.

Further progress has been made at this station towards the production of improved planting material of *Aleurites montana*. Promising mother trees are being selected from established plantations and, after several years of yield recording, the best of these are being propagated as buddings on seedling *montana* rootstocks, the resulting clones being planted in field trials for comparison, in order that final selection may be based on the performance of the buddings rather than on the yields of the mother trees themselves. To date, 354 provisional selections have been made from a survey covering approximately 20,000 trees, and clones have been established from 41 of the mother trees. Significant differences in yield were apparent between some of these clones when they bore their first small crop in 1943, but these may well be merely differences in precocity and it will be several years before there will be evidence as to which are

the best clones. Several trials have been planted in which buddings are compared with seedlings and in two of these fruiting began this year. The buddings gave significantly greater yields than the seedlings in both trials.

Several subsidiary investigations on buddings are in progress, amongst which are comparison of *montana* and *fordii* seedling rootstocks, work on the topworking of established male trees, and an experiment on fruit thinning with a precocious clone which shows a strong tendency to overbearing and subsequent irregular cropping. Observations on flowering and pollination in budded plantations have also been continued, and the data obtained indicate that monoclonal planting may easily result in failure to set a good crop owing to lack of pollen, and that even if a mixture of clones is planted it might easily happen that little or no pollen would be available for much of the female flower on the earliest clones. The provision of a small proportion of early flowering male trees is therefore desirable. Observations have so far been confined to young buddings and the position may be altered as they grow older, if changes in flowering habit occur.

The production of legitimate seedling families, from which it is hoped later to produce improved planting material by vegetative propagation of the best individuals, has continued, and some 420 seedlings resulting from last year's crosses were planted out. Experiments are also in progress with material derived from open-pollinated seed selected from outstanding trees in seedling plantations, and with clonal seed produced in isolated gardens of buddings.

Other work at the station includes cultural and manurial experiments, trial of a number of species of cover and green manure crops, investigations on the effect of various methods of storage and of nursery technique on tung seed germination, and small scale work on the less promising species of tung tree, *Aleurites fordii*.

EMPIRE COTTON GROWING CORPORATION.

NEWALE EXPERIMENTAL STATION. Whilst the full report of the Cotton Specialist will be published by the Corporation the following note on the work in progress at the station has been provided:—

"The merits of a three years "rest" period for the restoration of soil fertility in an eight year cropping cycle have been confirmed for maize as well as for cotton, and work has been begun to see if four years might not be even better. A decision as to this will be aided by a five years soil restoration experiment wherein maize will be used in the continuous cropping plots as the exhausting crop: this experiment, when completed, should shed much light on the problem presented by the local native practice of running down land under maize continuously planted. The fears expressed in 1942 about cotton/groundnut relations in a rotation have not proved justified so far.

It has been a poor year for the large scale commercial trial of U4-920 bulk. This cotton was grown in Dedza, Dowa, and Kota Kota districts in the S.W. Lake Shore areas, and although markets were generally disappointing, some very good yields were recorded in all areas. Certain Crown Land selections are proving satisfactory, and work on two of them is being intensified. Of the East African Upland types M Z 561 continues to the fore as a leading variety and its possibilities are being thoroughly explored."

PEST CONTROL. Mr. B. L. Mitchell, one of the Corporation's Entomologists engaged in the Protectorate, reports as follows:—

"As in previous years, research work on Red Bollworm and Stainers has been carried out at Salima and on the Lower River stations. Pupation records, pupal mortality experiments and time of planting experiments were undertaken at the field stations and various intensive experiments in the laboratory at Zomba. The main unsolved problem is still what factors are concerned in influencing pupal diapause. A large amount of information has been obtained on the temperature reactions of bollworm pupae. The factors governing the initiation of the diapause still, however, remain undiscovered. To this end large scale field experiments were carried out at Salima and Chiromo and small scale laboratory experiments at Zomba on the larval nutrition. The results do not suggest that any form of food is implicated. Further experiments in Zomba on the temperature reactions of bollworm larvae and eggs are in progress. A large scale experiment at Salima has shown that the diapausing pupal population can be significantly reduced by about 50 per cent. by a July uprooting followed immediately by digging, thus exposing pupae to attacks by predators over a maximum period. The intensive work on the relation of stainer breeding to the ecoclimate has been successfully concluded. The stainer records on the wild host trees are being maintained for another year."

In connection with the above the following extract from His Excellency the Governor's Address to the Fifty-ninth Session of Legislative Council is of interest:—

"As Honourable Members are aware, the ravages of bollworm have for many years constituted a threat to our Cotton industry, especially in the Lower Shire areas, and have caused much anxiety to all concerned. I am glad, therefore, to state that the entomological staff of the Empire Cotton Growing Corporation are able to report that, as a result of intensive investigation and research during the last four years, they have now an accurate appreciation of the causes of the severe fluctuations and heavy losses often suffered by the Lower River crop, and a full understanding of the scientific problems involved. They have thus reached a position where they can apply such knowledge to the formulation of measures directed against the insect pests concerned. I am told that it is possible to see, not one clear-cut and obvious line of attack, but several widely divergent courses, all of them having their merits and some defects. The selection of one of these courses will not depend wholly on entomological grounds but also upon general agricultural, economic and administrative considerations.

It is becoming increasingly evident that whatever control measures may be adopted they must, to be successful, be combined with a general improvement of agricultural conditions in the Lower River area. This will require the most careful study and discussion and the agreement of all concerned. Such discussions must be based on the full report on the cotton pest situation to be made by the technical officers concerned, and it will necessarily take some months for the marshalling of data and preparation of the report.

It is therefore, considered inadvisable, even though the technical side of the problem is now reasonably well understood, to attempt to introduce far-reaching changes during the coming planting season. The proposals will be fully ventilated in 1944 in time to put them into effect for the 1944/45 cotton season."

SOIL CONSERVATION.

Due to the fact that it proved impossible to recruit any additional Supervisors there have been only two officers on whole-time conservation duties during the year. The lack of suitable personnel for these services is solely responsible for the limitation of the programme which it has been possible to undertake for, whilst departmental staffs are able to perform maintenance work in all areas and even to carry out small-scale reclamation measures, the planning and organisation of conservation works of a capital nature requires the attention of whole-time qualified officers.

The following are the main items in the programme of Soil Conservation undertaken during the year:—

(a) A detailed survey of a block of land in the Chikwawa District was made with a view to the controlled resettlement thereon of a number of families from the over-crowded areas of the Cholo District. The survey revealed that from the agricultural viewpoint the land was suitable. The Geologist is completing his investigations regarding water supplies in the area.

(b) An investigation was carried out regarding land utilization in the Domasi Valley in Zomba District. It was found that considerable encroachment into the Forest Reserve had occurred, that inordinately steep slopes were under cultivation and that the pressure of population rendered it impossible to provide for restorative fallowing of the land. This state of affairs is largely attributable to the proximity of Zomba Township as the cultivators in question are profitably concerned in the daily supplies of perishable produce to the Township. Remedial measures have taken the form of re-aligning the boundaries of the Forest Reserve, thus permitting the use of more land for cultivation and forbidding cultivation on exhausted land or excessive slopes. Simple soil conservation rules are to be enforced and a Soil Conservation Instructor is now permanently stationed in the valley.

(c) A preliminary survey of a badly eroded watershed area in the Dedza District has been conducted. It is expected that three years will be occupied in carrying the scheme to completion and work is to be commenced on the cessation of the 1943/44 rainy season.

(d) A similar survey has been undertaken in the Lower Shire District. This Scheme also is to be put into operation during the 1944 dry season.

(e) Intensive work has been continued in the Misuku Land Usage Scheme, again with complete success. The Report for the previous year contained a detailed description of the Scheme.

(f) Protective measures, financed by a grant from the Native Welfare Fund, have been continued on gardens in the Ncheu District. The Agricultural Officer has again trained a number of Conservation Instructors, mainly for employment by the Native Authorities.

The above is a brief account of the particular projects which have been occupying the attention of the Soil Conservation Officer and his Supervisor during 1944. In addition to these, however, endless and consistent attention to conservation of the soil has been paid by all officers of the Departments concerned. More and more ridge cultivation is in evidence, more bunding has been undertaken and more storm drains have been constructed. Capital works are a prime necessity in many areas and provision is being made for these in the long-range proposals now being considered. Whilst it would as yet be premature to say that any considerable number of Africans are land conscious, in the sense that they appreciate the basic importance of treasuring their land heritage, it can confidently be recorded that the degree of land deterioration is being steadily retarded. Concrete gains are in visual evidence in many areas and there is no doubt that the necessity for the restoration of fertility is slowly receiving more appreciation by the users of the soil.

REPORT OF THE AGRICULTURAL CHEMIST.

Chemical work has comprised the examination and analysis of various agricultural products, soils and organic fertilisers, specimens from the Veterinary Department, and various oils.

The grading, packing and shipping of wild rubber, and the importation and distribution of fertilisers, have largely occupied the time of the Chemist.

ACKNOWLEDGMENT.

I desire once again to record the appreciation felt by myself and the staff of the Department to all those, officials and unofficials alike, who have assisted and co-operated so freely in our continued efforts to develop the agricultural resources of the Protectorate. Our endeavours have not always borne fruit but there has been no lack of initiative and energy. I wish personally to express my thanks to the staff of the Department for their unlimited zeal and support.

C. B. GARNETT,
Acting Director of Agriculture.

